EXPRESS MAIL LABEL NO. EL563155020US

10-26-00

A

DOCKET NO. YOR920000591US1

Assistant Commissioner for Patents
Washington, D. C. 20231

Sir:

Transmitted herewith for filing is the patent application of:

INVENTORS: Richard H. BOIVIE

TITLE: *MULTICAST ENABLED MAIL*

In connection with this application, the following are enclosed:

18 Pages of Specification, Claims and Abstract

20 Claims

7 Sheets of Drawings (FIGS. 1-5)

XX Associate Power of Attorney

XX Declaration, Power of Attorney

XX Assignment to: International Business Machines Corporation

The fee has been calculated as shown below. (Small entity fees indicated in parentheses.)

For	Number Filed		Number Extra	Rate Large (Small)	Basic Fee $710 ($355)
Total Claims	20	20	0	$18 ($9)	0
Independent Claims	6	3	3	$80 ($40)	240
Multiple Dependent Claims				$270 ($135)	0
Assignment Recording Fee				$40	40
				TOTAL FEE:	$ 990

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XX The Commissioner is hereby authorized to charge payments of (1) any additional filing fees required under 37 CFR 1.16, and/or (2) any patent application processing fees under 37 CFR 1.17 associated with this application or credit any overpayment to Deposit Account No. 50-0510.

XX Please direct all correspondence to Customer Number 23334.

Respectfully submitted,

BY: Jose Gutman
Jose Gutman
Reg. No. 35,171

FLEIT, KAIN, GIBBONS, GUTMAN
& BONGINI, P.L.
4400 N. Federal Highway, Suite 32
Boca Raton, FL 33431
(561)417-9477
(561)417-3844 Fax

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	:	Atty Docket: YOR920000591US1
Richard H. BOIVIE	:	APPLICATIONS BRANCH
Serial No. (not yet assigned)	:	
Filed: HEREWITH	:	
FOR: *MULTICAST ENABLED MAIL*	:	

CERTIFICATE OF EXPRESS MAIL MAILING

"Express Mail" Mailing Label No. **EL563155020US**
Date of Deposit: **October 24, 2000**

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Washington, D C. 20231

SIR:

I hereby certify that

X	Application Transmittal
X	Specification, Claims, Abstract
X	1 set of 7 sheets of drawings
X	Associate Power of Attorney
X	Declaration and Power of Attorney
X	Assignment
X	Return postcard

are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to:

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Washington, D.C. 20231

10/24/00
Date of Deposit

Kathleen Smith
Name of person mailing papers

Kathleen Smith
Signature

MULTICAST ENABLED MAIL

(Provided for Examination Reference Purposes)

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EXPRESS MAIL LABEL NO.: EL563155020US
DATE MAILED: October 24, 2000 PATENT

INVENTOR: Richard H. BOIVIE

MULTICAST ENABLED MAIL

PARTIAL WAIVER OF COPYRIGHT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application generally relates to the teachings of U.S. Patent Application No. 09/240,546, entitled "Reliable Multicast For Small Groups" filed on January 29, 1999, and of U.S. Patent Application No. 09/240,549, entitled "Multicast Support For Small Groups", filed on January 29, 1999, and of U.S. Patent Application No. 09/329,101, entitled "System For Multicast Communications In Packet Switched Networks" filed on June 9, 1999, which are all assigned to the same assignee as this application and the collective teachings of which are herein incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention generally relates to electronic mail systems, and more particularly it relates to an improved method and apparatus for distribution of electronic mail.

2. The Prior Art

Electronic mail systems use unicast today to distribute mail to users on a network such as the Internet or an IP-based enterprise network. Unicast means that a unique copy of a mail message is sent to each of the destination machines.

FIG. 1 illustrates a prior art system of electronic mail distribution (100) showing the replication of mail messages in an electronic mail transmission. The electronic mail distribution system as shown in FIG. 1 comprises a plurality of client machines (102, 110a to 110x) which may be personal computers, dumb terminals, workstations, PDA's, cell phones, other terminal devices, or the equivalent. Also, the prior art electronic mail distribution system of FIG. 1 further comprises a plurality of mail servers (104, 108a to 108n) and a plurality of routers (106a to 106f).

An electronic mail message (112a..z) is composed on a client computer (102) with a plurality of recipients (a..z) that have mailboxes on machines (108a to 108n). At the client's mail server (104), the message (112a..z) is replicated into a plurality of messages (112a..z) and one copy of the message is sent to each of the destinations. Alternatively, the client computer (102) itself may replicate the message and send a copy to each of the destinations. In the Internet or in a TCP/IP based enterprise network, these copies might be sent using the well-known TCP/IP protocols.

FIG. 2 illustrates a prior art functional sequence (200) of an electronic mail distribution system. First, a mail message (112a..z) is created (202) at a client machine (102). Then a mail message (112a..z) is duplicated (204), either at a client machine (102) or at a mail server (104), for each destination (110a to 110x). Then one copy of the mail message (112a..z) is sent (206) to each destination mailbox on mail servers (108a to 108n).

As is well known, electronic mail uses a significant amount of bandwidth in the Internet and in enterprise networks and since mail messages are expected to increase in size as audio, image and video attachments to electronic mail become more common, electronic mail will consume even more bandwidth. This increase in the amount of bandwidth that electronic mail will consume means that either there will be

less bandwidth available for other applications such as web-based applications or that more network bandwidth will be required which can be expensive. Thus, there is a need for an improved method and system for efficiently delivering electronic mail that consumes less network bandwidth.

SUMMARY OF THE INVENTION

A method for distributing electronic mail efficiently across a network of information processing units and intermediate nodes. The method on an information processing unit includes receiving a mail message created by a user with a list of destinations. Also, the method further includes sending a single copy of the mail message across the network via intermediate nodes to addresses indicated in the list of destinations using a multicast or reliable multicast technique.

The invention also includes the use of intermediate nodes that receive and forward multicast packets appropriately, i.e., in the direction of the various destinations. The forwarding of these multicast packets is accomplished, for example, as described in Application No. 09/329,101, filed on June 9, 1999, or via another reliable multicast mechanism.

BRIEF DESCRIPTION OF THE FIGURES

The subject matter which is regarded as the invention is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings.

FIG. 1 illustrates a prior art system of electronic mail distribution showing the replication of mail messages in an electronic mail transmission.

FIG. 2 illustrates a prior art functional sequence of an electronic mail distribution system.

FIG. 3 illustrates an electronic mail distribution system according to a preferred embodiment of the present invention.

FIG. 4a illustrates an exemplary functional sequence of an electronic mail application program in accordance with a preferred embodiment of the present invention.

FIG. 4b illustrates an exemplary functional sequence of a reliable multicast software according to a preferred embodiment of the present invention.

FIG. 4c illustrates an exemplary functional sequence of a reliable multicast software as practiced on intermediate nodes in accordance with a preferred embodiment of the present invention.

FIG. 5 illustrates an exemplary mail message for distribution in an electronic mail distribution system in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It is important to note that these embodiments are only examples of the many advantageous uses of the innovative teachings herein. In general, statements made in the specification of the present application do not necessarily limit any of the various claimed inventions. Moreover, some statements may apply to some inventive features but not to others. In general, unless otherwise indicated, singular elements may be in the plural and vice versa with no loss of generality.

In the drawing like numerals refer to like parts through several views.

Exemplary Embodiment Multicast Enabled Mail

FIG. 3 illustrates an exemplary electronic mail distribution system (300) according to a preferred embodiment of the present invention. The electronic mail distribution system (300) as shown in FIG. 3 comprises a plurality of client machines (102, 110a to 110x) comprising personal computers, DOS machines, WINDOWS machines, Macintosh machines, Linux machines, dumb terminals, cellular telephones, PDA's, and other terminal devices. Client machines (102, 110a to 110x) may also be referred to herein as client computers or as information processing units. An information processing unit (102, 110a to 110x), according to a preferred embodiment of

the present invention, comprises a reception unit for receiving a mail message and a transmission unit for transmitting the message into a network. A reception unit, according to one preferred embodiment of an information processing unit, may comprise a user interface for receiving a mail message composed by a user. Alternatively, the reception unit may comprise other types of interfaces for receiving and for storing a message, or message packets, destined for transmission as a mail message, or as message packets, in the electronic mail distribution system. The transmission unit may comprise, according to a preferred embodiment of the present invention, at least one of a modem, a network interface, a transceiver, a wireless transceiver, and other interfacing hardware and software. Also, the improved electronic mail distribution system of FIG. 3 further comprises a plurality of mail servers (104, 108a to 108n) and a plurality of routers (106a to 106f). Mail servers (104, 108a to 108n) and routers (106a to 106f) may also be referred to herein as intermediate nodes of the electronic mail distribution system (300). An intermediate node, according to a preferred embodiment of the present invention, comprises a reception unit that includes a network interface for receiving and for storing a message, or message packets, destined for transmission as a mail message, or as message packets, in the electronic mail distribution system. The intermediate node typically includes a processor operating according to software programs and memory coupled to the processor for storing information accessible by the processor. The processor utilizes software programs in the memory for determining whether to forward a received message to other nodes in the network. The processor receives message information, such as message packets, and stores this message information in the memory. After determining a "next hop" for a message, the processor forwards copy of the message information, e.g., message packets, to another node in the network. Additionally, according to an alternative preferred embodiment, the processor acknowledges ACK and/or NAK signals and retransmits message packets as may be necessary to forward a message, e.g., message packets, to another node in the network. Also, for reception of message information, e.g., message packets, the processor utilizes ACK and/or NAK signals to

communicate with another node in the network, such as to coordinate retransmission of message packets in the network.

An electronic mail message (112a..z) is composed on a client computer (102), the mail message (112a..z) destined for reception by a plurality of recipients (a..z) that correspond to mailboxes on destination mail servers (108a to 108n). Typically, the mail message (112a..z) is transmitted from the client computer to a mail server (104) which is responsible for delivering the mail message (112a..z) to the destination mail servers (108a to 108n). Typically, the mail message (112a..z) is transmitted from the client computer (102) to the mail server (104) in one or more packets using the well-known TCP/IP protocols. In one embodiment of this invention, the mail server (104) transmits the mail message (112a..z) to the destination mail servers (108a to 108n) using a reliable multicast protocol such as the Reliable Small Group Multicast (Reliable SGM) protocol such as described in Application No. 09/329,101, filed on June 9, 1999. In another exemplary embodiment of the present invention, the client computer (102) uses a reliable multicast protocol such as the Reliable SGM to transmit the message to the destination mail servers (108a to 108n). In either exemplary case, the source of the multicast packets (which in the examples can be the client machine (102) or the mail server (104)) sends a single stream of packets which are replicated at intermediate nodes acting as multicast routers so that an appropriate stream of packets reaches each of the destination mail servers (108a to 108n). For example, in FIG. 3, intermediate node 106c receives one or more packets from 106a and forwards copies of the packet or packets on to mail servers (108a and 108b). The intermediate nodes that are acting as multicast routers may use the Reliable SGM, such as described in Application No. 09/329,101, or another multicast mechanism. The intermediate nodes that are operating as multicast routers, according to an alternative preferred embodiment of the present invention, could be IP routers, mail servers or other nodes that have been augmented with appropriate multicast function. Since normally one copy of the mail message (e.g., one copy of any part of the mail message) traverses

any link in the network, the mail distribution system shown in FIG. 3 will be more efficient in terms of network bandwidth than existing mail distribution systems, such as shown in FIG. 1. FIGs. 4a, 4b and 4c, illustrate a preferred process for electronic mail message distribution in a reliable multicast system, according to a preferred embodiment of the present invention.

Mail Application Program Functionality

FIG. 4a illustrates an operational sequence (400a) of an electronic mail application program according to a preferred embodiment of the present invention. First, a mail message (112a..z) is created (402a) and then the mail message (112a..z) is distributed (404a) using a reliable multicast mechanism. As discussed above, the reliable multicast mechanism, according to a preferred embodiment of the present invention, utilizes the Reliable SGM mechanism such as described in Application No. 09/329,101, or via another mechanism for reliable multicast. Also, as discussed above, the source of the multicast transmission preferably can be a client computer (102) or a mail server (104).

Reliable Multicast Software Functionality

FIG. 4b illustrates a functional sequence (400b) of a reliable multicast software package according to a preferred embodiment of the present invention. First, a determination is made as whether there is more message to transmit, such as whether there are more characters (i.e., there is more message) to be transmitted (402b). If there are no more characters (i.e., no more message) to be transmitted then the process ends. However, if there are more characters (i.e., more message) to be transmitted then the process sends a multicast packet to the destinations (404b). The reliable multicast software might also, in certain alternative embodiments, process acknowledgment packets or ACKs and/or negative acknowledgments or NAKs and perform re-transmissions as described in Application No. 09/329,101. In other embodiments the ACKs and/or NAKSs and retransmissions might be handled by

intermediate nodes such as routers. As mentioned above a variety of different reliable multicast schemes are possible. Error detection and correction protocols may also be used as is well known in the art. For specific implementations, the particular choice of a reliable multicast mechanism and the particular choices for error detection and correction protocols should be obvious to one of ordinary skill in the art in view of the discussion above.

Intermediate Node Multicast Functionality

FIG. 4c illustrates a functional sequence (400c) of a multicast software that is operational on intermediate nodes utilizing the reliable SGM mechanism according to a preferred embodiment of the present invention. First, when a packet is received, for example, the destinations associated with the packet are partitioned (402c) based on the next node that the packet should be sent to for delivering to each of the destinations. This next node is also known as a "next hop" that the packet should be forwarded to for delivering to each destination. According to a preferred embodiment, a "next hop" comprises a node, which can be an intermediate node or a destination node, to which a packet should be transmitted in a multicast transmission. Then, an appropriate multicast packet is sent (404c) to each of these "next hops", preferably as described in Application No. 09/329,101. As mentioned above, other mechanisms for implementing a reliable multicast can also be used. Also, as mentioned above, the intermediate node multicast routing capability can be implemented on IP routers, mail servers or other nodes.

Mail Message

FIG. 5 illustrates a mail message (500) that utilizes an electronic mail distribution system as shown in FIG. 3. The mail message (500) of FIG. 5 contains two main mail recipients and four carbon copy recipients for a total of six recipients. The mailboxes for these six recipients might reside on five mail servers. A reliable multicast will be used to send copies of this mail message to each of the five mail servers. As stated above, the

source of the multicast can be a client computer or a mail server. If the reliable SGM mechanism is used as described in Application No. 09/329,101, the destination addresses that appear in the SGM packet are the addresses of the mail servers where the recipients have their mailboxes and these addresses would be used to route packets through the routers or intermediate nodes as described in Application No. 09/329,101. Of course, it's also possible to use other mechanisms for reliable multicast as discussed above.

Conclusion

Multicast-enabled mail uses a reliable multicast scheme, such as Reliable Small Group Multicast or other reliable multicast scheme in a mail distribution system to improve efficiencies in the distribution of electronic mail. Multicast-enabled mail can be used to reduce the cost of network bandwidth in the Internet or in an enterprise network or to increase the usefulness of the existing bandwidth in a given network by making it possible to support more users or more applications in a given amount of network bandwidth.

Discussion of Hardware and Software Implementation Options

The present invention, as would be known to one of ordinary skill in the art could be produced in hardware or software, or in a combination of hardware and software. The system, or method, according to the inventive principles as disclosed in connection with the preferred embodiment, may be produced in a single computer system having separate elements or means for performing the individual functions or steps described or claimed or one or more elements or means combining the performance of any of the functions or steps disclosed or claimed, or may be arranged in a distributed computer system, interconnected by any suitable means as would be known by one of ordinary skill in art.

According to the inventive principles as disclosed in connection with the preferred embodiment, the invention and the inventive principles are not limited to any particular

kind of computer system but may be used with any general purpose computer, as would be known to one of ordinary skill in the art, arranged to perform the functions described and the method steps described. The operations of such a computer, as described above, may be according to a computer program contained on a medium for use in the operation or control of the computer, as would be known to one of ordinary skill in the art. The computer medium which may be used to hold or contain the computer program product, may be a fixture of the computer such as an embedded memory or may be on a transportable medium such as a disk, as would be known to one of ordinary skill in the art.

The invention is not limited to any particular computer program or logic or language, or instruction but may be practiced with any such suitable program, logic or language, or instructions as would be known to one of ordinary skill in the art. Without limiting the principles of the disclosed invention any such computing system can include, inter alia, at least a computer readable medium allowing a computer to read data, instructions, messages or message packets, and other computer readable information from the computer readable medium. The computer readable medium may include non-volatile memory, such as ROM, Flash memory, floppy disk, Disk drive memory, CD-ROM, and other permanent storage. Additionally, a computer readable medium may include, for example, volatile storage such as RAM, buffers, cache memory, and network circuits.

Furthermore, the computer readable medium may include computer readable information in a transitory state medium such as a network link and/or a network interface, including a wired network or a wireless network, that allow a computer to read such computer readable information.

Although specific embodiments of the invention have been disclosed, those having ordinary skill in the art understand that changes can be made to the specific embodiments without departing from the spirit and scope of the invention. The scope of the invention is not to be restricted, therefore, to the specific embodiments, and it is intended that the appended claims cover any and all such applications, modifications,

and embodiments within the scope of the present invention.

What is claimed is:

CLAIMS

1. A method for distributing electronic mail efficiently across a network of information processing units and intermediate nodes, the method on an information processing unit comprising the steps of:

receiving a mail message created by a user with a list of destinations; and

sending a single copy of the mail message across the network via intermediate nodes to addresses corresponding to the list of destinations using a reliable multicast technique.

2. The method as defined in claim 1, wherein the reliable multicast technique comprises a reliable small group multicast technique.

3. An information processing unit for distributing electronic mail efficiently across a network of information processing units and intermediate nodes, the information processing unit comprising:

a reception unit for receiving a mail message with addresses corresponding to a list of destinations; and

a transmission unit for sending a single copy of the mail message across the network via intermediate nodes to addresses corresponding to the list of destinations using a reliable multicast technique.

4. The information processing unit as defined in claim 3, wherein the reliable multicast technique comprises a reliable small group multicast technique.

5. The information processing unit as defined in claim 3, wherein the transmission unit operates according to a communication protocol to process ACKs and NAKs as well as packet retransmissions.

6. A computer readable medium including instructions for distributing electronic mail efficiently across a network of information processing units and intermediate nodes, the computer readable medium comprising instructions for:

receiving a mail message with addresses corresponding to a list of destinations; and

sending the mail message across the network via intermediate nodes to the addresses corresponding to the list of destinations using a reliable multicast technique.

7. The computer readable medium as defined in claim 6, wherein the reliable multicast technique comprises a reliable small group multicast technique.

8. A method for distributing electronic mail across a network of information processing units and intermediate nodes, the method on an intermediate node comprising the steps of:

receiving a multicast packet;

determining one or more "next hops" for forwarding the packet;

replicating the packet for each "next hop"; and

forwarding one copy of the packet to each of the "next hops".

9. The method as defined in claim 8, wherein the determining, replicating and forwarding steps operate according to a Small Group Multicast scheme.

10. The method as defined in claim 8, further comprising the step of:

repetitively executing the determining, replicating and forwarding steps for each newly received packet.

11. The method as defined in claim 8, further comprising the steps of:

processing ACKs and/or NAKs; and

performing packet retransmissions.

12. The method as defined in claim 8, wherein the multicast packet comprises a small group multicast packet.

13. A computer readable medium including instructions for distributing electronic mail efficiently across a network of information processing units and intermediate nodes, the computer readable medium comprising instructions for:

receiving a packet containing address information for a list of destinations;

determining the "next hop" for each of those destinations; and

replicating the packet for each "next hop".

14. The computer readable medium as defined in claim 13, further comprising the instruction for:

forwarding a copy of the packet to each "next hop".

15. The computer readable medium as defined in claim 14, further comprising the instruction for:

repetitively executing the determining, duplicating and forwarding steps for each newly received packet.

16. The computer readable medium as defined in claim 15, further comprising the instructions for:

processing ACKs and/or NAKs; and

handling packet retransmissions.

17. An intermediate node for distributing electronic mail efficiently across a network of information processing units and intermediate nodes, the intermediate node comprising:

a reception unit for receiving a packet containing address information for a list of destinations;

a determination unit for determining the "next hop" for each of the destinations; and

a copying unit for replicating the packet for each of the "next hops".

18. The intermediate node as defined in claim 17, further comprising:

a forwarding unit for forwarding a copy of the packet to each of the "next hops".

19. The intermediate node as defined in claim 18, further comprising:

a repeater unit for repetitively executing the determining, duplicating and forwarding steps for each newly received packet.

20. The intermediate node as defined in claim 19, further comprising:

an acknowledge unit for processing ACKs and/or NAKs; and

a retransmit unit for handling packet retransmissions.

ABSTRACT

A method for distributing electronic mail efficiently across a network of information processing units and intermediate nodes. The method on an information processing unit includes receiving a mail message created by a user with a list of destinations. Also, the method further includes sending a single copy of the mail message across the network via intermediate nodes to addresses corresponding to the list of destinations using a reliable multicast technique. Also, the invention includes receiving a packet on an intermediate node where the packet contains address information for a list of destinations. Also, the invention includes determining at an intermediate node the "next hop" or "next hops" that the packet should be forwarded to and forwarding a copy of the packet to each of those "next hops".

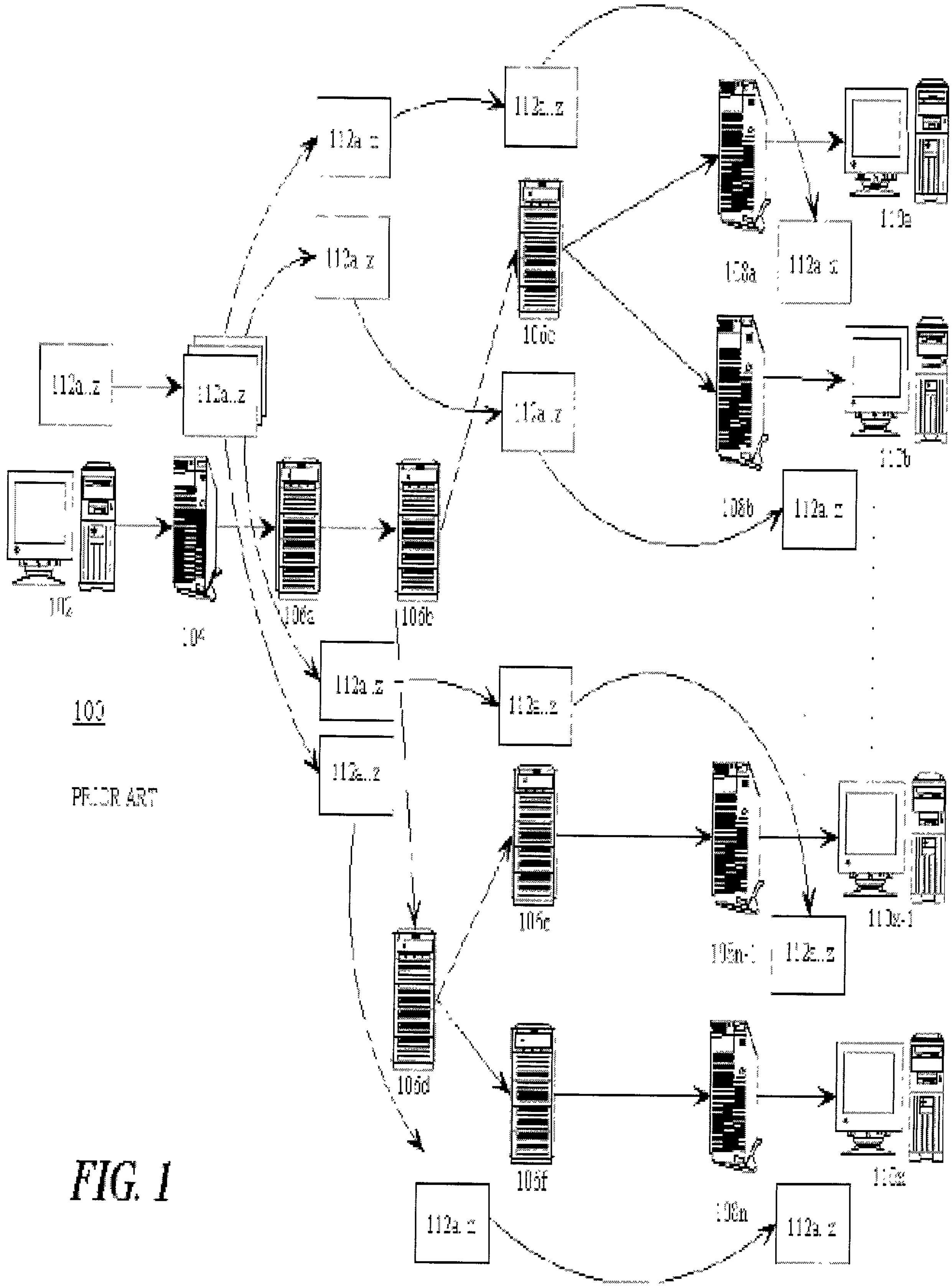

FIG. 1

200

"Prior Art

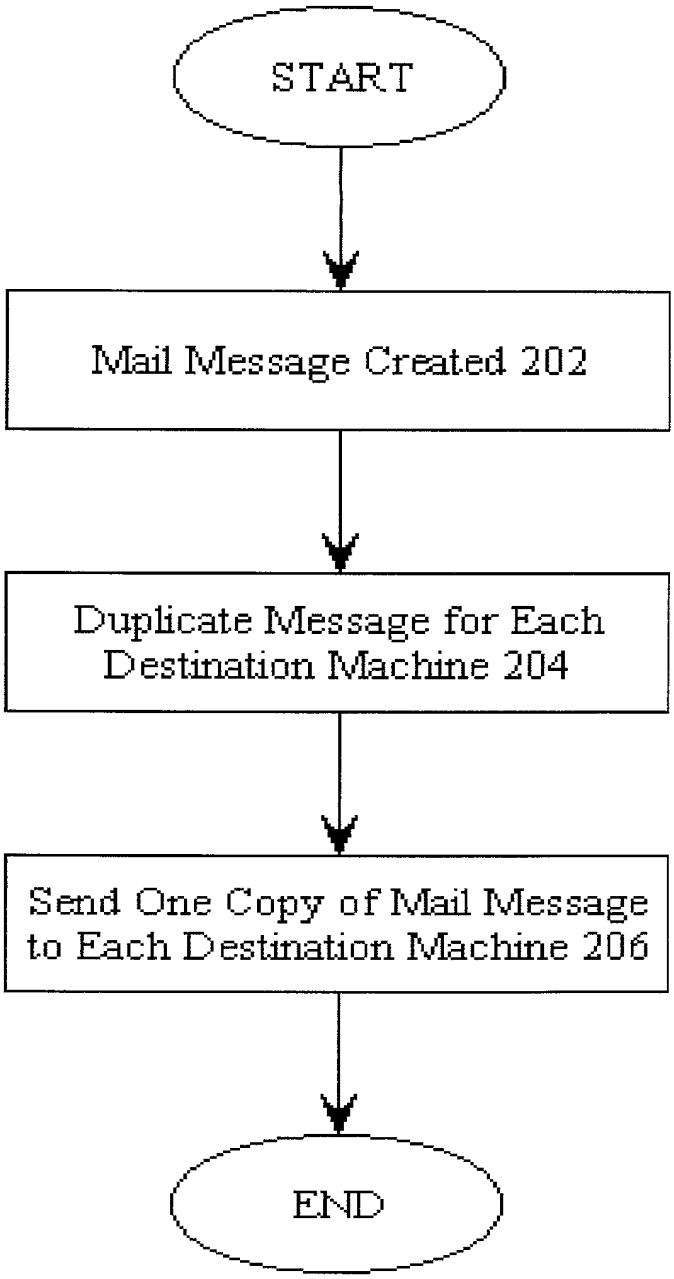

FIG. 2

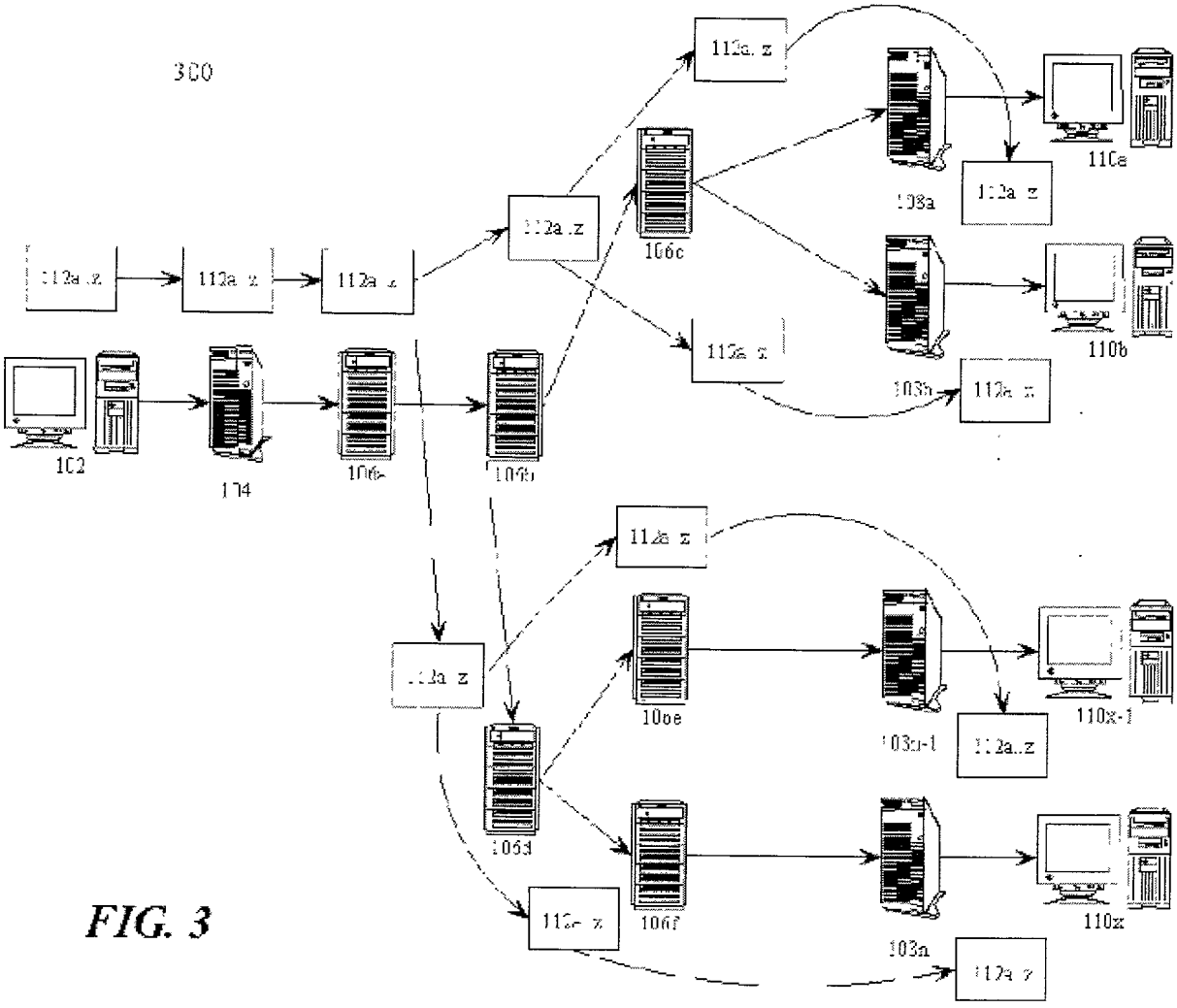
300
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
112a..z
102
104
106a
106b
106c
106d
106e
106f
108a
108b
108n-1
108n
110a
110b
110x-1
110x

FIG. 3

400a

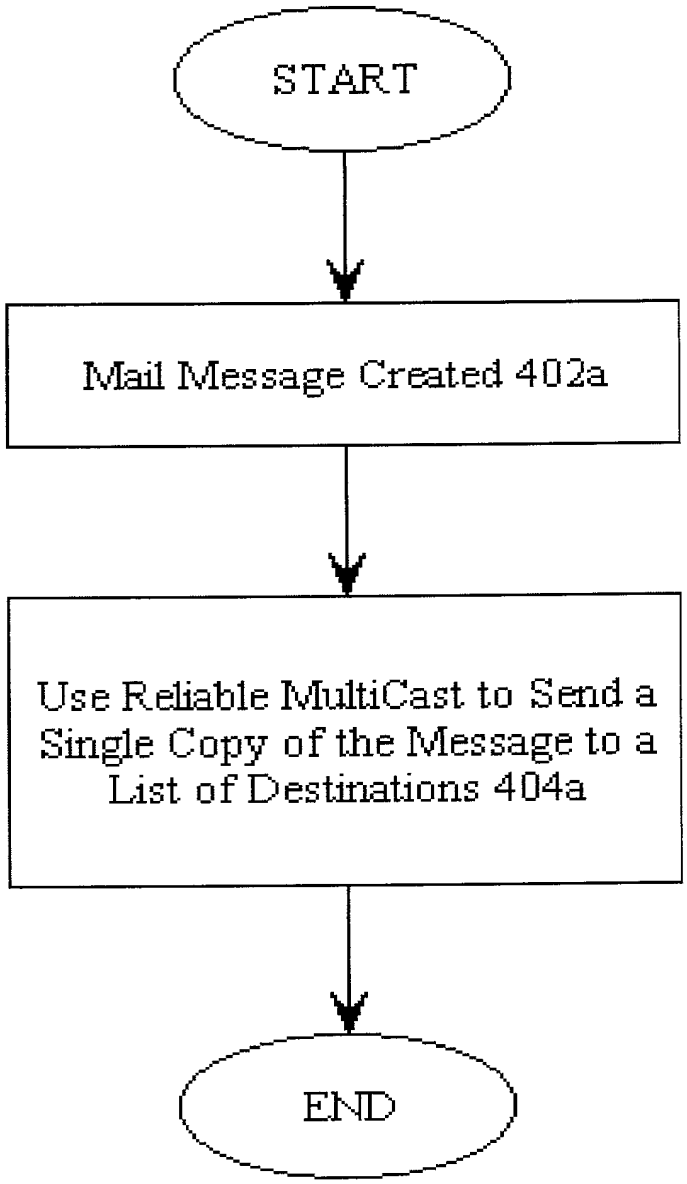
START
Mail Message Created 402a
Use Reliable MultiCast to Send a Single Copy of the Message to a List of Destinations 404a
END

FIG. 4a

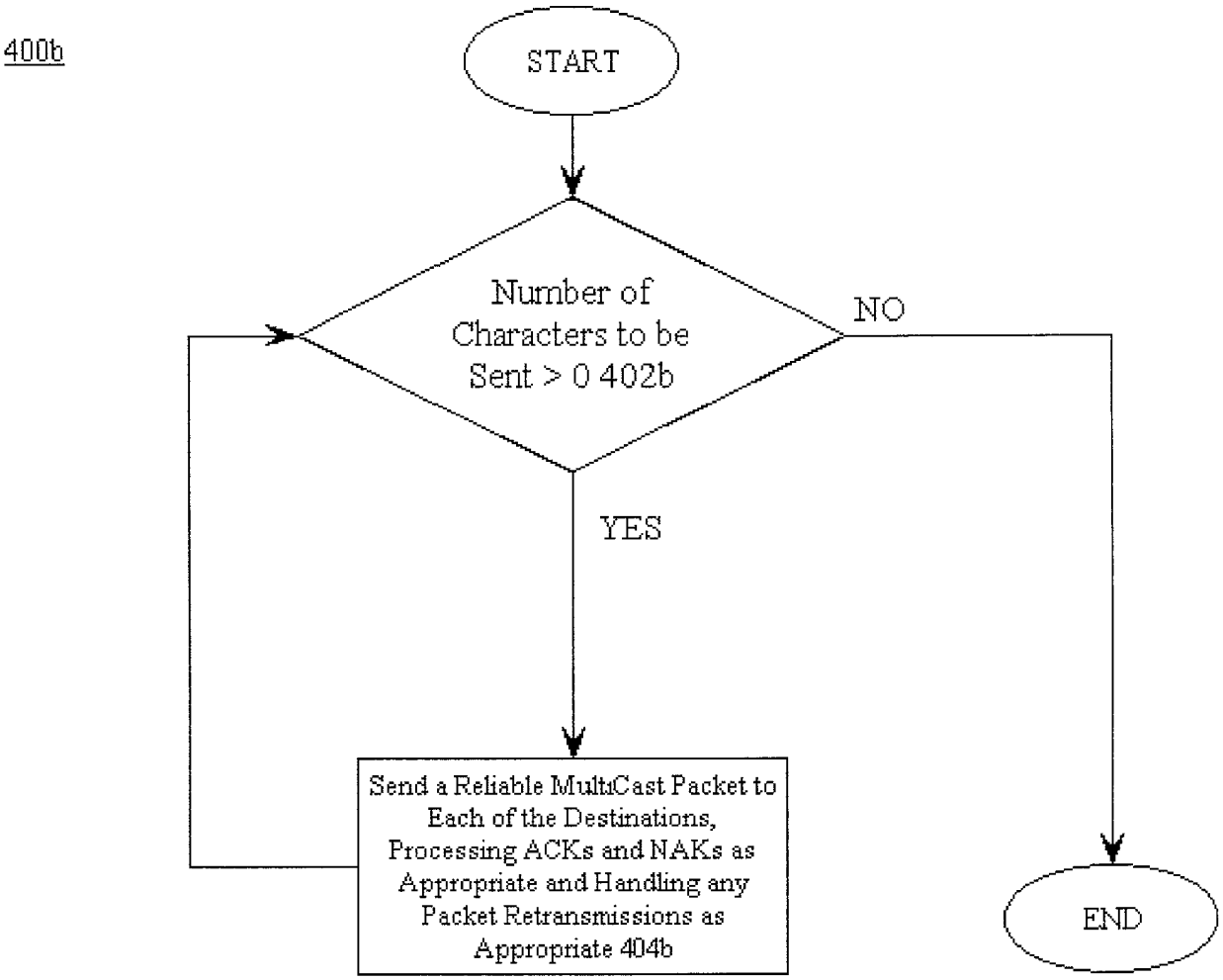
400b
START
Number of Characters to be Sent > 0 402b
NO
YES
Send a Reliable MultiCast Packet to Each of the Destinations, Processing ACKs and NAKs as Appropriate and Handling any Packet Retransmissions as Appropriate 404b
END

FIG. 4b

400c

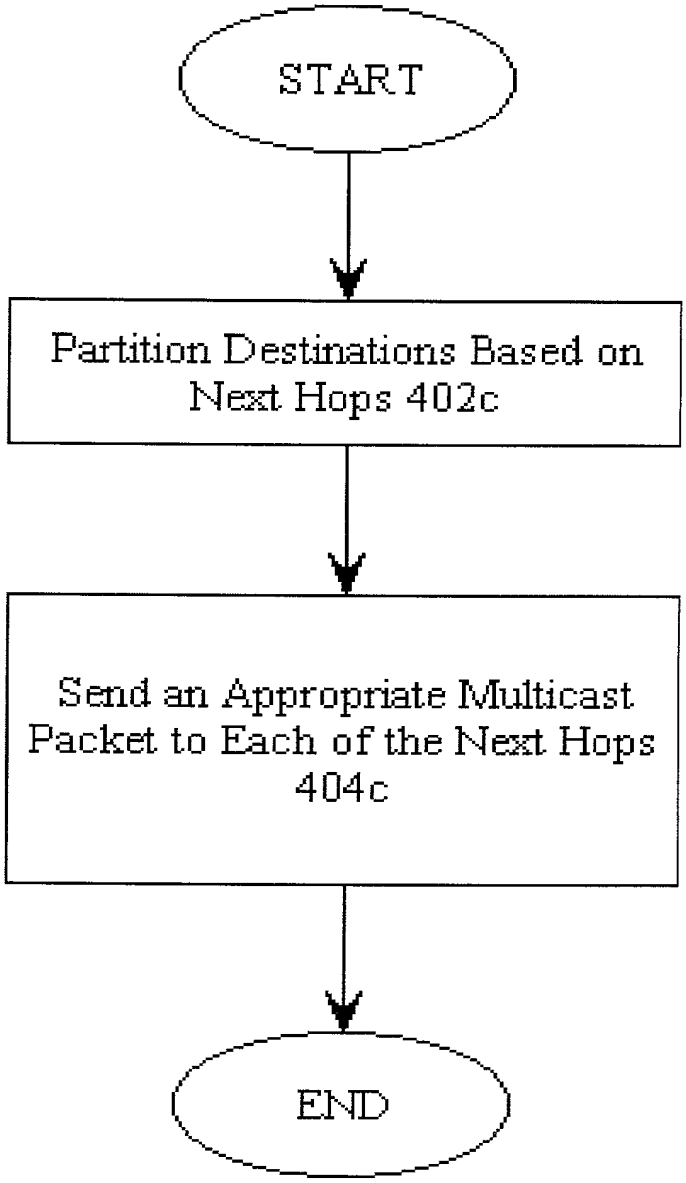
START
Partition Destinations Based on Next Hops 402c
Send an Appropriate Multicast Packet to Each of the Next Hops 404c
END

FIG. 4c

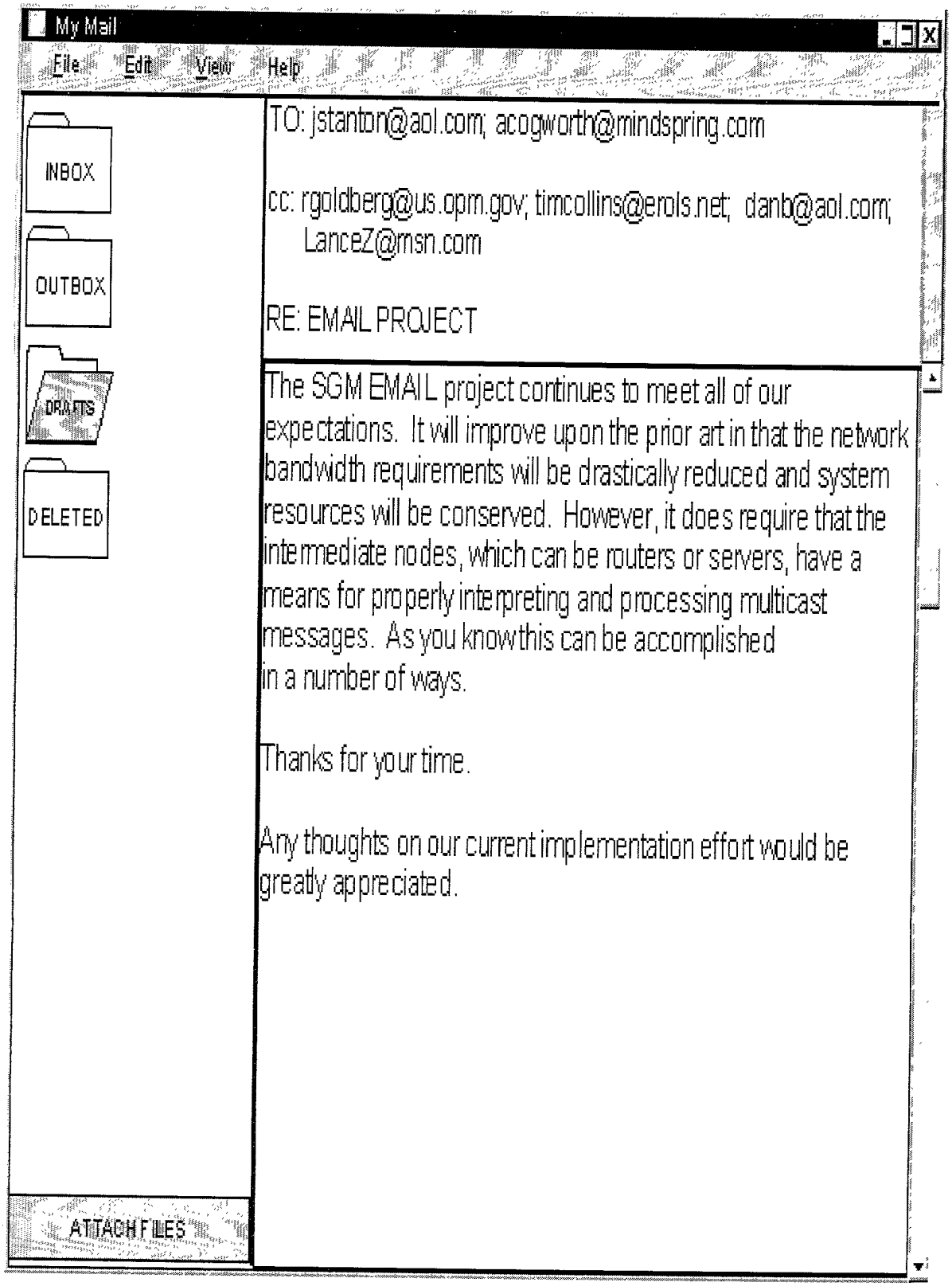
My Mail
File
Edit
View
Help
INBOX
OUTBOX
DRAFTS
DELETED
ATTACH FILES
TO: jstanton@aol.com; acogworth@mindspring.com
cc: rgoldberg@us.opm.gov; timcollins@erols.net; danb@aol.com; LanceZ@msn.com
RE: EMAIL PROJECT
The SGM EMAIL project continues to meet all of our expectations. It will improve upon the prior art in that the network bandwidth requirements will be drastically reduced and system resources will be conserved. However, it does require that the intermediate nodes, which can be routers or servers, have a means for properly interpreting and processing multicast messages. As you know this can be accomplished in a number of ways.
Thanks for your time.
Any thoughts on our current implementation effort would be greatly appreciated.
500

FIG. 5

EXPRESS MAIL LABEL NO. EL563155020US

PATENT

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

MULTICAST ENABLED MAIL

the specification of which: (check one)

XXX is attached hereto.

____ was filed on _____
under Attorney's Docket Number _____
as Application Serial No _____
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with 37 CFR 1.56.

I hereby claim the benefit of foreign priority under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application the priority of which is claimed:

Prior Foreign Application(s)			Priority Claimed
(Number)	(Country)	(Filing Date)	___Yes ___No

I hereby claim the benefit of United States priority under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in a listed prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information material to the patentability of this application as defined in 37 CFR 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial #)	(Filing Date)	(Status)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Manny W. Schecter	Reg. No. 31,722	Daniel P. Morris	Reg. No. 32,053
Terry J. Ilardi	Reg. No. 29,936	Louis J. Percello	Reg. No. 33,206
Douglas W. Cameron	Reg. No 31,596	Jay P. Sbrollini	Reg. No. 36,266
Louis P. Herzberg	Reg. No. 41,500	David M. Shofi	Reg. No. 39,835
Kevin M. Jordan	Reg. No. 40,277	Robert M. Trepp	Reg. No. 25,933
Stephen C. Kaufman	Reg. No. 29,551		

Direct all correspondence to Customer Number 23334, and direct all telephone calls to Jose Gutman (561) 417-9477.

FULL NAME OF INVENTOR: Richard H. BOIVIE

INVENTOR'S SIGNATURE: Richard H. Boivie DATE: October 23, 2000

RESIDENCE: 194 Cutlers Farm Road, Monroe, Connecticut 06468

CITIZENSHIP: United States

POST OFFICE ADDRESS: Same as above

Docket No. YOR920000591US1 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Richard H. BOIVIE Group No.. (not yet assigned)

Application No.: (not yet assigned) Examiner: (not yet assigned)

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ASSOCIATE POWER OF ATTORNEY (37 C.F.R. 1.34)

Assistant Commissioner for Patents
Washington, D.C. 20231

Please recognize as Associate Practitioner in this case:

Jose Gutman, Esq.
Fleit, Kain, Gibbons, Gutman & Bongini P.L.
4400 North Federal Highway
Suite 32
Boca Raton, Florida 33431
Reg. No.: 35,171
Tel. No. (561) 417-9477

SIGNATURE OF PRINCIPAL PRACTITIONER OF RECORD

Reg. No.: 31,722

Manny W. Schecter
(type or print name of practitioner)

Tel. No. (914)945-3252

IBM Corporation
P.O. Address

Intellectual Property Law Department
P.O. Box 218
Yorktown Heights, New York 10598

associatepoa.wpd